

Divide using synthetic division:

1. $\frac{x^5 - 3x^3 - x + 6}{x - 2}$

2. $\frac{x^3 - 3x^2 + x - 1}{x + 1}$

Divide using long division:

3. $\frac{x^4 - 2x^3 + 3x^2 - x + 4}{2x - 1}$

4. $\frac{x^4 - x^2 - 2x + 1}{x^2 + 1}$

Use Descartes' Rule of signs to determine the number of positive, negative, and imaginary roots.

5. $x^4 - 2x^3 + x - 2$

6. $2x^5 - 2x^4 + 5x^3 - 5x^2 + 2x + 12$

List the possible rational roots:

7. $x^4 - 2x^3 + x - 2$

8. $2x^5 - 2x^4 + 5x^3 - 5x^2 + 2x + 12$

Find the zeros: **Use the answers to #5-8 to help you!!

9. $x^4 - 2x^3 + x - 2$

10. $2x^5 - 2x^4 + 5x^3 - 5x^2 + 2x + 12$

Find the limits of the following:

11. $\lim_{x \rightarrow \infty} \frac{x^2 - 9x + 9}{x^2 - 1}$

12. $\lim_{x \rightarrow \infty} \frac{-2x^4}{x^2 - 1}$

13. $\lim_{x \rightarrow \infty} \frac{2x^3 - 9x + 1}{4x^3 - 5x + 2}$

14. $\lim_{x \rightarrow \infty} \frac{1}{x - 9}$

15. $\lim_{x \rightarrow \infty} \frac{1}{x} - 9$

16. $\lim_{x \rightarrow \infty} \left(\frac{1}{x} + 9 \right)$

Graph each function:

17. $y = \frac{1}{x-3}$

18. $y = \frac{(x-1)(x+2)(x+3)}{x^2-4x+3}$ **Watch out for holes!!

Find all asymptotes (vertical, horizontal, slant) and holes.

19. $y = \frac{-2}{x+2}$

20. $y = \frac{x-1}{x^2+x-2}$

21. $y = \frac{x^3-1}{(x-1)(x+2)}$

Find the zeros of the polynomial function and state the multiplicity of each zero.

22. $y = (x-1)^3(x+2)^4$

23. $y = (x^2-4)^3$

24. $y = (x^2+1)^2(x-3)^3$

One zero of the polynomial is given; find all the zeros.

25. $x^4 - 2x^3 + 5x^2 - 6x + 6 = 0$; $1+i$

26. $x^4 + 2x^2 - 63 = 0$; $-3i$

Simplify:

27. $-i^7$

28. $(2-3i)-(5+6i)$

29. $(2+5i)(2-5i)$

30. $\frac{1-8i}{3+2i}$

Use the quadratic formula to solve:

31. $2x^2 - 5x - 3 = 0$

32. $x^2 - 5x + 3 = 0$